[54] **METHOD AND SYSTEM FOR TRACKING MULTIPLE REGIONAL OBJECTS BY MULTI-DIMENSIONAL RELAXATION**

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Related U.S. Application Data

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[51] **Int. Cl.^{6}** **G01S 13/00**
[52] **U.S. Cl.** **342/96**
[58] **Field of Search** 342/96

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,406,289	4/1995	Barker et al.	342/96
5,537,119	7/1996	Poore, Jr.	342/96

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[57] **ABSTRACT**

A method and system for real-time tracking of objects is disclosed. A region is repeatedly scanned providing a plurality of images or data sets having points corresponding to objects in the region to be tracked. Given a previously determined track for each object in the region, an M-dimensional combinatorial optimization assignment problem is formulated using the points from M-1 of the images or data sets, wherein each point is preferably used in extending at most one track. The M-dimensional problem is subsequently solved for an optimal or near-optimal assignment of the points to the tracks, extending the tracking of the objects so that a response to each object can be initiated by the system in real-time. Speed and accuracy is provided by an iterative Lagrangian Relaxation technique wherein a plurality of constraint dimensions are relaxed simultaneously to yield a reduced dimensional optimization problem whose solution is used to formulate an assignment problem of dimensionality less than M. The iterative reducing of dimensions terminates when exact solutions are determined for two-dimensional cases. A recovery procedure is used for determining a higher dimensional assignment problem solution from a problem having one less dimension. The procedure is useful when the reduced dimensional optimizational problem has two constraint dimensions.

1 Claim, 6 Drawing Sheets

INPUT FROM 104

OUTPUT TO 110,112,122,130